(OP 56) Comparative Study of the Multidifferentiation Potential of Human Wharton's Jelly and Amniotic Fluid Derived Stem Cells

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Mesenchymal stem cells (MSCs), potentially immune-privileged cells, have been isolated from bone marrow, umbilical cord, e.g. umbilical vein and Wharton's Jelly, and from amniotic fluid. Amniotic fluid cells were used for prenatal diagnosis since 1950. Although being a well established diagnostic technique, little is known about the origin and properties of those cells, its embryonic or foetal origin remaining unclear.

In this study, we compared the osteogenic and chondrogenic potential of human Wharton's Jelly derived cells (WJCs) and amniotic fluid stem cells (hAFSCs). We used MSCs isolated from around the blood vessels (perivascular zone) of umbilical cords collected in caesarean surgeries of full-term pregnancies, and hAFSCs from day 6 supernatant of the cultures of amniotic fluid were also obtained from amniocentesis. Flow cytometry analysis was performed to characterize both cell populations, by evaluating the presence of stem cell surface markers. Osteogenic and chondrogenic differentiation was assessed by immunocytochemistry and RT-PCR.

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adult organism, including osteoblasts. Here we sought to test the hypothesis that ESCs follow similar patterns of gene and protein expression as marrow stromal cells (MSCs) using qPCR, immunocytochemistry (ICC) and Raman spectroscopy. ESCs and MSCs were grown for 28 days in the presence of 280 μM ascorbate, 10 mM β-glycerophosphate, with 1μM dexamethasone added at d14 (osteogenic medium). At various timepoints qPCR was performed on extracted RNA using primers to Osteocalcin, Col1a1 and Col2a1 with normalisation using a combination of 3 different housekeeping genes. Cells were fixed at d0, d14 and d28 and stained with antibodies to Osteocalcin, Runx2 and Collagen type II. Live cells were examined by Raman spectroscopy with a 785 nm laser and spectra were examined between wavenumbers 400 and 1900 cm^{-1}. Osteocalcin expression was not significantly different in ESCs and MSCs at d0, but had increased by 900-fold in MSCs by d14 compared to only 3-fold in ESCs. Col1α1 expression was 1000-fold greater in MSCs than in ESCs at d0 but by d14 had increased 500-fold in ESCs compared to 10-fold in MSCs. Col2α1 peaked at d14 in both cell types (5-10-fold), and was detectable by ICC and Raman spectroscopy only at this timepoint. These results demonstrate that osteo- and chondogenic markers follow similar patterns of expression in ESCs and MSCs but are expressed at lower levels in ESCs.